

7001  
 6/27/00  
 10010

U.S. PATENT APPLICATION  
PATENT AND TRADEMARK COMMISSIONER FOR PATENTS  
Washington, D.C. 20231

Sir:

Transmitted herewith for filing is the patent application of  
Applicant(s): Eric Anderson and Patricia Scardino  
Title: System And Method For Controlling Parameters In An Electronic Imaging Device

Enclosed are:

- 43 pages of specification, claims and abstract.
- 14 sheets of [x] informal [ ] formal drawing(s).
- A declaration and power of attorney.
- An assignment transmittal.
- An assignment of the invention to: FlashPoint Technology  
Please record the assignment and return to the undersigned.
- A certified copy of a \_\_\_\_\_ application.
- An associate power of attorney.
- A verified statement to establish small entity status under 37 CFR §§ 1.9 and 1.27.
- PTO Form-1449 and copies of cited art.

The filing fee has been calculated as shown below:

For [ ]	(Col. 1) No. Filed	(Col. 2) No. Extra	Small Entity		or	Other Than a Small Entity	
			Rate	Fee		Rate	Fee
Basic Fee				\$375.00			\$770.00
Total Claims	21- 20 =*	1	x \$11.00 =	\$		x \$22 =	\$22.00
Indep. Claims	4- 3 = *	1	x \$40.00 =	\$		x \$80 =	\$80.00
Multiple Dependent Claims Present [ ]			+ \$130 =	\$		+ \$260 =	\$
*If the difference in column 1 is less than zero, enter 0 in column 2			Total	\$	or	Total	\$872.00

Please charge my Deposit Account No. 06-0600 the amount of \$ \_\_\_\_\_. A duplicate copy of this sheet is enclosed.

A check in the amount of \$912.00 to cover the filing fee [x] and recording of assignment is enclosed.

The Commissioner is hereby authorized to charge payment of the following fees during the pendency of this application or credit any overpayment to Deposit Account No. 06-0600. A duplicate copy of this sheet is enclosed.

- Any additional filing fees required under 37 CFR § 1.16.
- Any patent application processing fees under 37 CFR § 1.17.
- The issue fee set in 37 CFR § 1.18 at or before mailing of the Notice of Allowance, pursuant to 37 CFR § 1.311(b).

Respectfully submitted,

  
 Gregory J. Koerner, Registration No. 38,519  
 Carr, DeFilippo & Ferrell LLP  
 2225 East Bayshore Road, Suite 200  
 Palo Alto, California 94303  
 (415) 812-3439

Dated: 7-25-97

**DECLARATION AND POWER OF ATTORNEY FOR UTILITY PATENT APPLICATION**

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below, next to my name,

I believe I am an original, first and joint inventor of the subject matter which is claimed and for which a patent is sought on the invention entitled:

**"System And Method For Controlling Parameters In An Electronic Imaging Device"**

the specification of which

is attached hereto.  
 was filed on \_\_\_\_\_ as \_\_\_\_\_  
 Application Serial No. \_\_\_\_\_  
 and was amended on \_\_\_\_\_  
 (if applicable)

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above. I do not know and do not believe that the same was ever known or used in the United States of America before my invention thereof, or patented or described in any printed publication in any country before my invention thereof or more than one year prior to this application, that the same was not in public use or on sale in the United States of America more than one year prior to this application, and said invention has not been patented or made the subject of an inventor's certificate issued before the date of this application in any country foreign to the United States of America on an application filed by me or my legal representatives or assigns more than twelve months prior to this application.

I acknowledge the duty to disclose information which is material to the examination of this application in accordance with Title 37, Code of Federal Regulations, Section 1.56(a).

I hereby claim foreign priority benefits under Title 35, United States Code, Section 119, of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

<u>Prior Foreign Application(s)</u>	<u>Priority Claimed</u>			
(Number)	(Country)	(Day/Month/Year Filed)	Yes	No
(Number)	(Country)	(Day/Month/Year Filed)	Yes	No

I hereby claim the benefit under Title 35, United States Code, Section 120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, Section 112, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, Section 1.56(a) which occurred between the filing date of the prior application and the national or PCT international filing date of this application:

---

(Application Serial No.) (Filing Date)

(Status) (patented, pending, abandoned)

---

(Application Serial No.) (Filing Date)

(Status) (patented, pending, abandoned)

POWER OF ATTORNEY: I hereby appoint

Stephen Sullivan, Reg. No. 38,329; John S. Ferrell, Reg. No. 34,593;  
J. Eppa Hite, Reg. No. 30,266; and Gregory J. Koerner, Reg. No. 38,519

as my attorneys, with full power of substitution and revocation, to prosecute this application and to transact all business in the Patent and Trademark Office connected herewith.

Send all correspondence to:

Gregory J. Koerner, Reg No. 38,519  
Carr, DeFilippo & Ferrell  
2225 East Bayshore Road, Suite 200  
Palo Alto, CA 94303  
TEL: (415) 812-3400

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Full Name of Joint Inventor: Eric Anderson

Inventor's Signature Eric Anderson Dated: 7/21/97

Residence: 931 Brentwood Drive, San Jose, California 95129

Post Office Address: Same Citizenship: USA

Full Name of Joint Inventor: Patricia Scardino

Inventor's Signature Patricia Scardino Dated: July 21, 1997

Residence: 47734 Briles Court, Fremont, California 94539

Post Office Address: Same Citizenship: USA

1           SYSTEM AND METHOD FOR CONTROLLING PARAMETERS  
2           IN AN ELECTRONIC IMAGING DEVICE

4           BACKGROUND OF THE INVENTION

5    1.    Field of the Invention

6           This invention relates generally to electronic imaging devices and  
7    more particularly to a system and method for controlling parameters in an  
8    electronic imaging device.

9

10   2.    Description of the Background Art

11          Effective control of user preferences and system parameters is an  
12    important consideration for users, designers and manufacturers of many  
13    electronic devices and systems. Control of system parameters is  
14    particularly important in modern electronic imaging systems (such as  
15    digital camera devices) which often feature a substantial number of  
16    system parameters that are adjustable depending upon individual user  
17    preferences. Examples of such adjustable camera preferences include  
18    selectable exposure settings, image compression ratios, camera flash  
19    settings and zoom speed specifications.

20          Efficiently controlling the operating parameters of an electronic  
21    imaging device ideally allows the system user to capture image data of

1 maximum quality. However, in order to consistently capture high-quality  
2 image data, the system for controlling camera operating parameters must  
3 be both flexible and powerful. System flexibility provides satisfactory  
4 methods to fulfill user needs and preferences, depending upon the current  
5 photographic environment. A powerful system results from efficiently  
6 providing techniques to control the operating parameters in a user-  
7 friendly and effective manner.

8 Some conventional imaging systems have adjustable operating  
9 parameters which are not retained after a system powerdown occurs. In  
10 portable imaging systems typically powered by batteries (for example,  
11 digital cameras), the system must remain constantly powered to retain  
12 current parameter settings (for example, an exposure setting). A system  
13 user must therefore risk battery failure at an inopportune moment, or  
14 repeatedly reset the desired operating parameters each time the imaging  
15 system is powered up.

16 Other conventional imaging systems have the ability to simply set a  
17 user preference which is then “remembered” as a default value after the  
18 system is powered down and subsequently powered up again. This  
19 implementation has a significant disadvantage because the default value is  
20 altered each time that a particular corresponding preference is adjusted.

1 Since the default value directly tracks the current parameter setting, this  
2 particular implementation is relatively inflexible and ineffective from the  
3 system user's perspective.

4 Still other conventional imaging systems have limited capabilities to  
5 manipulate the various system operating parameters. For example, such  
6 imaging systems may lack the ability to selectively restore particular  
7 system defaults as required by a system user. In other words, the  
8 command set for controlling user preferences and operating parameters is  
9 not sufficiently powerful.

10 As the foregoing discussion suggests, effective and efficient  
11 functioning of an electronic imaging device may be enhanced by a flexible  
12 and powerful approach to controlling operating parameters. Therefore, an  
13 improved system and method are needed for controlling parameters in an  
14 electronic imaging device, according to the present invention.

1                   SUMMARY OF THE INVENTION

2         In accordance with the present invention, a system and method are  
3         disclosed for controlling parameters in an electronic imaging device. In the  
4         preferred embodiment of the present invention, a digital camera includes a  
5         set of operating parameters which may be advantageously configured  
6         according to the demands of particular photographic environments. To  
7         allow system users to flexibly and effectively capture images, the  
8         adjustable operating parameters may be stored as parameter values in a  
9         series of discrete locations, including a factory defaults location, a user  
10        defaults location and a current parameters location. In the preferred  
11        embodiment, the factory defaults are stored in a non-volatile memory, the  
12        user defaults are stored in an electrically-erasable programmable read-  
13        only memory, and the current parameters are stored in a random-access  
14        memory. In alternate embodiments, parameter values may readily be  
15        stored using various other configurations and implementations.

16         In accordance with the present invention, a parameter manager may  
17         control the parameter values stored in the factory defaults location, the  
18         user defaults location and the current parameters location. The parameter  
19         manager typically controls the stored parameter values in response to a  
20         set of commands which may be generated by a central processing unit

1 within the digital camera, by an external host computer which may be  
2 coupled to the digital camera via an input/output interface or by special  
3 parameter scripts provided on a removable memory device. In the  
4 preferred embodiment, the above-referenced commands include, but are  
5 not limited to, a GetState command, a SetState command, a GetDefault  
6 command, a SetDefault command and a RestoreDefault command.

7       The GetState command causes the parameter manager to access and  
8 send specified current parameters to either the camera's central processing  
9 unit or to the above-mentioned external command sources. The SetState  
10 command causes the parameter manager to set selected current  
11 parameters to a value specified by either the camera's central processing  
12 unit or by the above-mentioned external command sources.

13       The GetDefault command causes the parameter manager to  
14 selectively access parameter values from either the user defaults or the  
15 factory defaults and then send the selected parameter values to either the  
16 camera's central processing unit or to the above-mentioned external  
17 command sources. The SetDefault command causes the parameter  
18 manager to set selected user defaults to a value obtained from either the  
19 camera's central processing unit, the above-mentioned external command  
20 sources, the current parameters or the factory defaults. The

1 RestoreDefault command causes the parameter manager to restore the  
2 current parameters to values selectively obtained from either the user  
3 defaults or the factory defaults.

4 The factory defaults, the user defaults and the current parameters  
5 are therefore flexibly and efficiently controlled by the parameter manager  
6 through the SetState command, the GetState command, the GetDefault  
7 command, the SetDefault command and the Restore Default command. The  
8 present invention thus provides an improved system for controlling  
9 parameters in an electronic imaging device.

1

BRIEF DESCRIPTION OF THE DRAWINGS

2 FIG. 1 is a block diagram of a digital camera, according to the present  
3 invention;

4 FIG. 2 is a block diagram of one embodiment for the imaging device  
5 of FIG. 1;

6 FIG. 3 is a block diagram of one embodiment for the computer of FIG.  
7 1;

8 FIG. 4 is a memory map of one embodiment of the non-volatile  
9 memory of FIG. 3;

10 FIG. 5 is a memory map of one embodiment of the dynamic random-  
11 access memory of FIG. 3;

12 FIG. 6A is an elevation view of one embodiment for the back of the  
13 FIG. 1 camera;

14 FIG. 6B is a plan view of one embodiment for the top of the FIG. 1  
15 camera;

16 FIG. 7 is a memory map of one embodiment for the current  
17 parameters of FIG. 5;

18 FIG. 8A is a block diagram of a basic system for generating  
19 parameter commands, in accordance with the present invention;

1 FIG. 8B is a block diagram of the preferred embodiment for  
2 controlling parameters in an electronic imaging device, according to the  
3 present invention;

4 FIG. 9 is a flowchart of method steps for a GetState command,  
5 according to the present invention;

6 FIG. 10 is a flowchart of method steps for a SetState command,  
7 according to the present invention;

8 FIG. 11 is a flowchart of method steps for a GetDefault command,  
9 according to the present invention;

10 FIG. 12 is a flowchart of method steps for a SetDefault command,  
11 according to the present invention; and

12 FIG. 13 is a flowchart of method steps for a RestoreDefault command,  
13 according to the present invention;

1                   DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

2         The present invention relates to an improvement in electronic  
3         imaging devices, including digital cameras. The following description is  
4         presented to enable one of ordinary skill in the art to make and use the  
5         invention and is provided in the context of a patent application and its  
6         requirements. Although the present invention will be described in the  
7         context of a digital camera, various modifications to the preferred  
8         embodiment will be readily apparent to those skilled in the art and the  
9         generic principles herein may be applied to other embodiments. That  
10       is, any image capture device with displays images, icons and/or other  
11       items, could incorporate the features described hereinbelow and that  
12       device would be within the spirit and scope of the present invention.  
13       Thus, the present invention is not intended to be limited to the  
14       embodiment shown but is to be accorded the widest scope consistent  
15       with the principles and features described herein.

16         The present invention comprises a system and method for controlling  
17         parameters in an electronic imaging device and includes a series of  
18         parameter storage locations coupled to the imaging device for containing  
19         parameter value sets, a set of parameter commands for controlling the  
20         parameter value sets, and a parameter manager device for executing the

1 set of parameter commands to control the parameters in the electronic  
2 imaging device, in accordance with the present invention.

3

4 Referring now to FIG. 1, a block diagram of a digital camera 110  
5 for use in accordance with the present invention is shown. Camera 110  
6 preferably comprises an imaging device 114, a system bus 116 and a  
7 computer 118. Imaging device 114 is optically coupled to an object 112  
8 and electrically coupled via system bus 116 to computer 118. Once a  
9 photographer has focused imaging device 114 on object 112 and, using  
10 a capture button or some other means, instructed camera 110 to  
11 capture an image of object 112, computer 118 commands imaging  
12 device 114 via system bus 116 to capture raw image data representing  
13 object 112. The captured raw image data is transferred over system  
14 bus 116 to computer 118 which performs various image processing  
15 functions on the image data before storing it in its internal memory.  
16 System bus 116 also passes various status and control signals between  
17 imaging device 114 and computer 118.

18

19 Referring now to FIG. 2, a block diagram of one embodiment of  
20 imaging device 114 is shown. Imaging device 114 typically comprises a

1 lens 220 having an iris, a filter 222, an image sensor 224, a timing  
2 generator 226, an analog signal processor (ASP) 228, an  
3 analog-to-digital (A/D) converter 230, an interface 232, and one or  
4 more motors 234.

5 Imaging device 114 captures an image of object 112 via reflected  
6 light impacting image sensor 224 along optical path 236. Image sensor  
7 224, which is typically a charge-coupled device (CCD), responsively  
8 generates a set of raw image data in CCD format representing the captured  
9 image 112. The raw image data is then routed through ASP 228, A/D  
10 converter 230 and interface 232. Interface 232 has outputs for controlling  
11 ASP 228, motors 234 and timing generator 226. From interface 232, the  
12 raw image data passes over system bus 116 to computer 118.  
13

14 Referring now to FIG. 3, a block diagram of one embodiment for  
15 computer 118 is shown. System bus 116 provides connection paths  
16 between imaging device 114, electrically-erasable programmable read-  
17 only memory (EEPROM) 341, an optional power manager 342, central  
18 processing unit (CPU) 344, dynamic random-access memory (DRAM)  
19 346, input/output interface (I/O) 348, non-volatile memory 350, and  
20 buffers/connector 352. Removable memory 354 connects to system bus

1 116 via buffers/connector 352. In alternate embodiments, camera 110  
2 may also readily be implemented without removable memory 354 or  
3 buffers/connector 352.

4 Power manager 342 communicates via line 366 with power  
5 supply 356 and coordinates power management operations for camera  
6 110. CPU 344 typically includes a conventional processor device for  
7 controlling the operation of camera 110. In the preferred embodiment,  
8 CPU 344 is capable of concurrently running multiple software routines  
9 to control the various processes of camera 110 within a multi-threading  
10 environment. DRAM 346 is a contiguous block of dynamic memory  
11 which may be selectively allocated to various storage functions. LCD  
12 controller 390 accesses DRAM 346 and transfers processed image data  
13 to LCD screen 302 for display.

14 I/O 348 is an interface device allowing communications to and  
15 from computer 118. For example, I/O 348 permits an external host  
16 computer (not shown) to connect to and communicate with computer  
17 118. I/O 348 also interfaces with a plurality of buttons and/or dials  
18 304, and an optional status LCD 306, which, in addition to LCD screen  
19 302, are the hardware elements of the camera's user interface 308.

1       Non-volatile memory 350, which may typically comprise a  
2 conventional read-only memory or flash memory, stores a set of  
3 computer-readable program instructions to control the operation of  
4 camera 110. Removable memory 354 serves as an additional image  
5 data storage area and is preferably a non-volatile device, readily  
6 removable and replaceable by a camera 110 user via buffers/connector  
7 352. Thus, a user who possesses several removable memories 354 may  
8 replace a full removable memory 354 with an empty removable  
9 memory 354 to effectively expand the picture-taking capacity of  
10 camera 110. In the preferred embodiment of the present invention,  
11 removable memory 354 is typically implemented using a flash disk.

12       Power supply 356 supplies operating power to the various  
13 components of camera 110. In the preferred embodiment, power  
14 supply 356 provides operating power to a main power bus 362 and also  
15 to a secondary power bus 364. The main power bus 362 provides  
16 power to imaging device 114, I/O 348, non-volatile memory 350 and  
17 removable memory 354. The secondary power bus 364 provides power  
18 to power manager 342, CPU 344 and DRAM 346.

19       Power supply 356 is connected to main batteries 358 and also to  
20 backup batteries 360. In the preferred embodiment, a camera 110 user

1 may also connect power supply 356 to an external power source.  
2 During normal operation of power supply 356, the main batteries 358  
3 provide operating power to power supply 356 which then provides the  
4 operating power to camera 110 via both main power bus 362 and  
5 secondary power bus 364. During a power failure mode in which the  
6 main batteries 358 have failed (when their output voltage has fallen  
7 below a minimum operational voltage level) the backup batteries 360  
8 provide operating power to power supply 356 which then provides the  
9 operating power only to the secondary power bus 364 of camera 110.

10

11 Referring now to FIG. 4, a memory map showing one embodiment of  
12 non-volatile memory 350 is shown. In the FIG. 4 embodiment, non-  
13 volatile memory 350 includes control application 400, toolbox 402, drivers  
14 404, kernel 406 and system configuration 408. Control application 400  
15 comprises program instructions for controlling and coordinating the  
16 various functions of camera 110. Toolbox 402 contains selected function  
17 modules including parameter manager 410, menu dialog manager 414,  
18 EEPROM interface 418 and command handler 422.

19 Parameter manager 410 includes software routines which control  
20 and coordinate various operating parameters in camera 110, according

1 to the present invention. Parameter manager 410 is further discussed  
2 below in conjunction with FIGS. 8-13. Menu dialog manager 414  
3 includes software routines which coordinate functions related to the  
4 user interface 308, including displaying information on LCD screen 302  
5 and handling information input from buttons 304. EEPROM interface  
6 418 coordinates communications to and from EEPROM 341 via system  
7 bus 116. Command handler 422 accesses and handles various system  
8 commands and advantageously provides the commands to the  
9 appropriate destination within camera 110. Selected commands are  
10 further discussed below in conjunction with FIGS. 8-13.

11 Drivers 404 control various hardware devices within camera 110 (for  
12 example, motors 234). Kernel 406 provides basic underlying services for  
13 the camera 110 operating system. System configuration 408 performs  
14 initial start-up routines for camera 110, including the boot routine and  
15 initial system diagnostics.

16

17 Referring now to FIG. 5, a memory map showing one embodiment  
18 of dynamic random-access-memory (DRAM) 346 is shown. In the FIG. 5  
19 embodiment, DRAM 346 includes RAM disk 532, a system area 534, and  
20 working memory 530.

1       RAM disk 532 is a memory area used for storing raw and  
2 compressed image data and typically is organized in a "sectored" format  
3 similar to that of conventional hard disk drives. In the preferred  
4 embodiment, RAM disk 532 uses a well-known and standardized file  
5 system to permit external host computer systems, via I/O 348, to  
6 readily recognize and access the data stored on RAM disk 532. System  
7 area 534 typically stores data regarding system errors (for example,  
8 why a system shutdown occurred) for use by CPU 344 upon a restart of  
9 computer 118.

10      Working memory 530 includes various stacks, data structures and  
11 variables used by CPU 344 while executing the software routines used  
12 within computer 118. Working memory 530 also includes input buffers  
13 538 for initially storing sets of raw image data received from imaging  
14 device 114 for image conversion, and frame buffers 536 for storing data  
15 for display on the LCD screen 402.

16      In a preferred embodiment, a conversion process is performed by  
17 a live view generation program, which is stored in non-volatile memory  
18 350 and executed on CPU 344. However, the conversion process can  
19 also be implemented using hardware. Referring again to FIG. 3, during  
20 the execution of the live view generation program (not shown), CPU 344

1 takes the raw image data from input buffers 538 in CCD format and  
2 performs color space conversion on the data. The conversions process  
3 performs gamma correction and converts the raw CCD data into either a  
4 RGB or YCC color format which is compatible with the LCD screen 402.  
5 After the conversion, CPU 344 stores the image data in frame buffers  
6 536. The LCD controller 390 then transfers the processed image data  
7 from the frame buffers to the LCD screen 402 (via an optional analog  
8 converter) for display.

9 Working memory 346 further contains current parameters 540  
10 which preferably include current settings for adjustable parameters in  
11 camera 110. Current parameters 540 are further discussed below in  
12 conjunction with FIG. 7 which includes a TABLE I listing examples of  
13 preferred current parameters 540.

14

15 FIGS. 6A and 6B are diagrams depicting the preferable hardware  
16 components of the user interface 308 of camera 110. FIG. 6A is a back  
17 view of camera 110 showing the LCD screen 302, a four-way navigation  
18 control button 609, an overlay button 612, a menu button 614, and a  
19 set of programmable soft keys 616. FIG. 6B is a top view of camera 110  
20 showing a shutter button 618, and a mode dial 620. The camera may

1    optionally include status LCD 306, status LCD scroll and select buttons  
2    622 and 624, a sound record button 626, and zoom-in, zoom-out  
3    buttons 626a and 626b.

4                 The user interface 308 includes several different operating modes  
5    for supporting various camera functions. However, the modes relevant  
6    to this description are review mode, menu mode, and capture (record)  
7    mode. In review mode, the camera 110 supports the actions of  
8    reviewing camera contents, editing and sorting images, and printing and  
9    transferring images. In menu mode, the camera 110 allows the user to  
10   manipulate camera settings and to edit and organize captured images.  
11   In capture mode, the camera 110 supports the actions of preparing to  
12   capture an image, and capturing an image through the use of either the  
13   LCD screen 302 or the status LCD 306.

14                 The user switches between the review, menu, and capture modes,  
15   using the mode dial 620. When the camera is placed into a particular  
16   mode, that mode's default screen appears in the LCD screen 302 in  
17   which a set of mode-specific items, such as images, icons, and text, are  
18   displayed.

19

1 Referring now to FIG. 7, a memory map of one embodiment for  
2 current parameters 540 of FIG. 5A is shown. Current parameters 540  
3 comprise parameter 1 (710 (a)) through parameter “N” (710(d)) which  
4 each preferably include, but are not limited to, current settings for  
5 various operational and functional attributes of camera 110. Specific  
6 preferred examples for parameter 1 (710(a)) through parameter “N”  
7 (710(d)) are provided and described below in TABLE I. However,  
8 various other parameters not listed in TABLE I may readily be  
9 implemented in alternate embodiments of the present invention.

**TABLE I:**

PNAME	DESCRIPTION	VALUE TYPE	VALUE RANGE
xmod	Exposure mode specification	UInteger List	1= Auto 2= Shutter priority 3= Aperture priority 4= Gain priority 5= Manual
fmod	Focus mode specification	UInteger List	1= Auto 2= Program 3= Manual
smod	Strobe mode specification	UInteger List	0= Off 1= Auto 2= Fill 3= Slave 4= Sync
zpos	Zoom position specification	UInteger List	100=1X (no zoom) 200=2X 300=3X
shut	Shutter speed specification; measured in steps, with 16666 being equivalent to 1/60 second	UInteger	125 through 4000000
fdst	Focus distance specification; measured in centimeters, with 65535 being infinity	UInteger	30 through 65535

1 Referring now to FIG. 8A, a block diagram of a basic system for  
2 generating parameter commands in camera 110 is shown, in accordance  
3 with the present invention. The FIG. 8A system includes removable  
4 memory 354 (FIG. 3), parameter manager 410, menu dialog manager  
5 414, an external host computer 850, and LCD screen 302 and  
6 buttons/dials 304 (both from user interface 308 of camera 110).

7 Parameter manager 410 includes software routines which  
8 advantageously control and coordinate various operating parameters in  
9 camera 110, in accordance with the present invention. Parameter  
10 manger 410 preferably functions in response to a set of parameter  
11 commands which are described below in conjunction with FIGS. 8B  
12 through 13. The parameter commands may be generated from several  
13 different sources to provide greater flexibility in camera 110. In the  
14 preferred embodiment, the parameter commands may be generated  
15 directly from user interface 308 of camera 110, from an external host  
16 computer 850, or from special parameter scripts 862 provided on  
17 removable memory 354 in camera 110.

18 For example, camera 110 includes menu dialog manager 414  
19 which communicates with parameter manager 410 via line 858 to  
20 display parameter information on LCD screen 302 via line 864. A

1 system user may then use buttons/dials 304 to initiate parameter  
2 commands via line 856 and to subsequently interact with selected  
3 parameters in camera 110.

4 Furthermore, external host computer 850 may communicate with  
5 parameter manager 410 via line 852 to initiate parameter commands  
6 and to subsequently interact with selected parameters in camera 110.

7 In addition, removable memory 354 in camera 110 may be flexibly  
8 programmed with special parameter scripts 862 that a system user can  
9 then selectively execute to initiate and control parameter commands via  
10 line 860.

11

12 Referring now to FIG. 8B, a block diagram of the preferred  
13 embodiment for controlling parameters in camera 110 is shown,  
14 according to the present invention. The FIG. 8B embodiment includes  
15 current parameters 540 (described above in conjunction with FIGS. 5  
16 and 7), user defaults 810 and factory defaults 812. User defaults 810  
17 are adjustable parameter settings which are preferably stored in  
18 EEPROM 341 and thus are retained even when camera 110 is powered  
19 down. Factory defaults 812 are fixed parameter settings which are  
20 preferably stored in non-volatile memory 350 of camera 110.

1        In alternate embodiments, current parameters 540, user defaults  
2    810 and factory defaults 812 may also be readily implemented using  
3    various other hardware and/or software configurations, in accordance  
4    with the present invention. Furthermore, in alternate embodiments, the  
5    present invention may include various other parameter storage  
6    locations in addition to (or instead of) current parameters 540, user  
7    defaults 810 and factory defaults 812.

8        Like current parameters 540, user defaults 810 and factory  
9    defaults 812 may also be configured to include a parameter 1 (710(a))  
10   through a parameter “N” (710(d), as shown above in the FIG. 7 diagram.  
11   Furthermore, user defaults 810 and factory defaults 812 may include  
12   the parameter examples provided in TABLE I above, or may alternately  
13   include various other parameters not specifically listed in TABLE I.

14       Camera 110 preferably loads user defaults 810 into current  
15   parameters 540 during or following each power up sequence so that  
16   camera 110 typically starts up with parameter values from user  
17   defaults 810. However, when camera 110 is initially powered up after  
18   manufacture, the user defaults 810 have not yet been set by a system  
19   user. Therefore, factory defaults 812 from non-volatile memory 350  
20   are preferably loaded into user defaults 810 within EEPROM 341.

1 Camera 110 thus initially starts up with parameter values from factory  
2 defaults 812.

3 Camera 110 uses parameter manager 410 to advantageously  
4 control and/or access values stored in current parameters 350, user  
5 defaults 810 and factory defaults 812. In the preferred embodiment,  
6 parameter manager 410 operates in response to a set of commands  
7 which include, but are not limited to, a GetState command 816, a  
8 SetState command 818, a GetDefault command 822, a SetDefault  
9 command 828 and a RestoreDefault command 836. Each of the above  
10 commands includes one or more command parameters which, in the  
11 following discussion, are bracketed with parentheses for clarity.

12 The GetState command 814 sends (PName) to request one or more  
13 current settings of current parameter(s) 540. The (PName) corresponds  
14 to a specific parameter of camera 110. In the preferred embodiment, it  
15 may be a symbolic name as shown in TABLE I, or in alternate  
16 embodiments, (PName) may simply be a number. In response,  
17 parameter manager 410 sends the specified current parameter(s) 540  
18 to the source of the GetState command 814 via path 816. Only if  
19 (PName) is NULL does parameter manager 410 return all current

1 parameters 540. Parameter manager 410 then provides the specified  
2 current parameter(s) 540 to the source of the GetState command 814.

3 The SetState command 818 on path 820 preferably sends  
4 (PNameValueStruct) to change one or more current settings of current  
5 parameters 540. Parameter manager 410 then sets the designated  
6 current parameter 540 to a value specified in (PNameValueStruct).  
7 Either the user of camera 110 or an external source may generate the  
8 SetState command 818 to advantageously update current parameters  
9 540.

10 The GetDefault command 822(a) sends (DefaultSource, PName) to  
11 request one or more parameter settings from user defaults 810. The  
12 GetDefault command 822(b) sends (DefaultSource, PName) to request  
13 one or more parameter settings from factory defaults 812.  
14 (DefaultSource) specifies whether to utilize user defaults 810 or factory  
15 defaults 812 as a source. In response, parameter manager 410 either  
16 sends the specified user default(s) 810 via path 824, or sends the  
17 specified factory defaults 812 via path 826. If (PName) is NULL, then  
18 parameter manager 410 returns all parameters from the selected  
19 source. Parameter manager 410 then provides the specified parameter  
20 values to either the user of camera 110 or to an external command

1 source (depending on which device generated the GetDefault command  
2 822(a) or 822(b)).

3       The SetDefault command 828 preferably sends (UpdateSource,  
4 PNameValueStruct) to change one or more current settings of user  
5 defaults 810. (UpdateSource) indicates which source is used to update  
6 user defaults 810. Parameter manager 410 sets the designated user  
7 default(s) 810 specified in (PNameValueStruct). Either the user of  
8 camera 110 or an external source may generate the SetDefault  
9 command 828(a) on path 830 to cause values set with the command to  
10 be stored as user defaults 810. SetDefault command 828(b) on path  
11 832 causes parameter manager 410 to set the designated user  
12 default(s) 810 using current parameters 540 as a source. SetDefault  
13 command 828(c) on path 834 causes parameter manager 410 to set the  
14 designated user default(s) 810 using factory defaults 812 as a source.

15       The RestoreDefault command 836 preferably sends  
16 (DefaultSource, PName) to change one or more current settings of  
17 current parameters 540. The RestoreDefault command 836 causes  
18 parameter manager 410 to restore the designated current parameter(s)  
19 540 to the current value of the specified source. (DefaultSource)  
20 indicates which source is used to restore current parameters 540.

1       The RestoreDefault command 836(a) on path 838 causes  
2 parameter manager 410 to restore the designated current parameter(s)  
3 540 with user defaults 810 as a source. The RestoreDefault command  
4 828(b) on path 840 causes parameter manager 410 to restore the  
5 designated current parameter(s) 540 using factory defaults 812 as a  
6 source. If (PName) is NULL, then all values in current parameters 540  
7 are preferably restored to the values in the selected source.

8       In addition to the foregoing examples, the present invention may  
9 also readily include various other parameter commands. For example,  
10 the present invention preferably includes a GetCapabilities command  
11 which advantageously retrieves information, capabilites and  
12 permissible values for selected parameters that are supported in  
13 camera 110.

14       The current parameters 540, user defaults 810 and factory  
15 defaults 812, in combination with GetState command 816, SetState  
16 command 818, GetDefault command 822, SetDefault command 828 and  
17 RestoreDefault command 836 thus provide a flexible and effective  
18 system for controlling parameters in camera 110, according to the  
19 present invention.

20

1 Referring now to FIG. 9, a flowchart of method steps for a GetState  
2 command 814 is shown, according to the present invention. In step  
3 910, parameter manager 410 receives a GetState command 814 from  
4 either a user of camera 110 or from an external command source. Then,  
5 in step 911, parameter manager 410 determines whether (PName)  
6 within the GetState command is a valid parameter name for camera  
7 110. If so, parameter manager 410, in step 912, determines whether  
8 (PName) within the GetState command 814 is a NULL value. If (PName)  
9 is not NULL, then parameter manager 410, in step 914, gets and sends  
10 the specified current parameter 540 to the source of the GetState  
11 command 814. If (PName) is NULL, then parameter manager 410, in  
12 step 916, gets and sends all current parameters 540 to the source of the  
13 GetState command 814.

14

15 Referring now to FIG. 10, a flowchart of method steps for a  
16 SetState command 818 is shown, according to the present invention. In  
17 step 1010, parameter manager 410 receives a SetState command 818  
18 from either a user of camera 110 or from an external command source.  
19 In step 1012, parameter manager 410 selects the appropriate

1 parameter type based on the (PNameValueStruct) within the SetState  
2 command 818.

3 If the parameter type of step 1012 is a 32-byte string or a 4-  
4 character string, then the FIG. 10 process goes directly to step 1018.

5 However, if the parameter type is a value range of numbers, then  
6 parameter manager 410, in step 1014, determines whether the value  
7 specified in the SetState command 818 is within the defined range for  
8 that parameter. If within the specified range, then step 1014 proceeds  
9 to step 1018. If not within the specified range, then an error is  
10 indicated in step 1016. Likewise, if the parameter type is a list of  
11 values, then parameter manager 410, in step 1020, determines whether  
12 the value specified in the SetState command 818 is on the defined list  
13 for that parameter. If on the defined list, then step 1020 proceeds to  
14 step 1018. If not on the defined list, then an error is indicated in step  
15 1016. In step 1018, parameter manager 410 then sets the specified  
16 current parameter 540 to the value specified in the SetState command  
17 818.

18 In the preferred embodiment, parameter manager 410  
19 advantageously refers to a resource file to obtain necessary parameter  
20 information from a parameter database. The resource file may include,

1 but is not limited to, information like factory defaults, parameter types  
2 and parameter values (such as ranges or lists).

3

4 Referring now to FIG. 11, a flowchart of method steps for a  
5 GetDefault command 822 is shown, according to the present invention.  
6 In step 1110, parameter manager 410 receives a GetDefault command  
7 822 from either a user of camera 110 or from an external command  
8 source. In step 1112, parameter manager 410 selects user defaults 810  
9 or factory defaults 812 as a source, depending on a (DefaultSource)  
10 within the GetDefault command 822.

11 Then, in step 1113, parameter manager 410 determines whether  
12 (PName) within the GetDefault command is a valid parameter name for  
13 camera 110. If so, parameter manager 410, in step 1114, determines  
14 whether (PName) within the GetDefault command 822 is a NULL value.  
15 If (PName) is not NULL, then parameter manager 410, in step 1116,  
16 gets and sends the value of the specified parameter from the selected  
17 source (user defaults 810 or factory defaults 812). If (PName) is NULL,  
18 then parameter manager 410, in step 1118, gets and sends the values of  
19 all parameters from the selected source (user defaults 810 or factory  
20 defaults 812).

1  
2 Referring now to FIG. 12, a flowchart of method steps for a  
3 SetDefault command 828 is shown, according to the present invention.  
4 In step 1210, parameter manager 410 initially receives a SetDefault  
5 command 828 and responsively determines whether the Pname is valid  
6 in step 1211. If the PName is valid, then parameter manager 410, in  
7 step 1212, determines the source of updating information from  
8 (UpdateSource) within SetDefault command 828. If the source is  
9 external (from either CPU 344 within camera 110 or from an external  
10 command source), then the FIG. 12 process goes directly to step 1214.

11 However, if parameter manager 410, in step 1212, determines  
12 that user defaults 810 or factory defaults 812 are designated as the  
13 updating source, then parameter manager 410, in step 1216,  
14 determines whether (PName) within the SetDefault command 828 is a  
15 NULL value. If (PName) is not NULL, then parameter manager 410, in  
16 step 1214, sets the specified parameter using the selected source  
17 (external, user defaults 810 or factory defaults 812). If (PName) is  
18 NULL, then parameter manager 410, in step 1218, sets all parameters  
19 using the selected source (user defaults 810 or factory defaults 812).

20

1 Referring now to FIG. 13, a flowchart of method steps for a  
2 RestoreDefault command 836 is shown, according to the present  
3 invention. In step 1310, parameter manager 410 initially receives a  
4 RestoreDefault command 836. In step 1312, parameter manager 410  
5 selects user defaults 810 or factory defaults 812 as a source, depending  
6 on a (DefaultSource) within the RestoreDefault command 836.

7 Then, in step 1313, parameter manager 410 determines whether  
8 (PName) within the RestoreDefault command is a valid parameter name  
9 for camera 110. If so, parameter manager 410, in step 1314,  
10 determines whether (PName) within the RestoreDefault command 836  
11 is a NULL value. If (PName) is not NULL, then parameter manager 410,  
12 in step 1316, restores current parameters 540 to the specified  
13 parameter from the selected source (user defaults 810 or factory  
14 defaults 812). If (PName) is NULL, then parameter manager 410, in  
15 step 1318, restores all parameters in current parameters 540 using the  
16 selected source (user defaults 810 or factory defaults 812).

17 The invention has been explained above with reference to a  
18 preferred embodiment. Other embodiments will be apparent to those  
19 skilled in the art in light of this disclosure. For example, the present  
20 invention may readily be implemented using configurations other than

1 those described in the preferred embodiment above. Furthermore, the  
2 present invention may effectively be used in conjunction with systems  
3 other than the one described above as the preferred embodiment.  
4 Therefore, these and other variations upon the preferred embodiments  
5 are intended to be covered by the present invention, which is limited  
6 only by the appended claims.

WHAT IS CLAIMED IS:

1    1. A system for controlling parameters in an electronic device,  
2    comprising:  
3         a series of parameter storage locations coupled to said electronic  
4                          device for containing value sets corresponding to said  
5                          parameters;  
6         a set of parameter commands for controlling said value sets  
7                          within said series of parameter storage locations; and  
8         a parameter manager device coupled to said electronic device for  
9                          executing said set of parameter commands to control said  
10                         value sets corresponding to said parameters.

1   2.   The system of claim 1 wherein said series of parameter storage  
2   locations include:

3           a current parameters location containing value sets corresponding  
4               to current parameters within said electronic device;  
5           a user defaults location containing value sets corresponding to  
6               user defaults within said electronic device; and  
7           a factory defaults location containing value sets corresponding to  
8               factory defaults within said electronic device.

1   3.   The system of claim 2 wherein said current parameters location is  
2   in a random-access memory, said user defaults location is in an  
3   electrically-erasable programmable read-only memory, and said factory  
4   defaults location is in a non-volatile memory.

1   4.   The system of claim 2 wherein said set of parameter commands  
2   includes a GetState command which causes said parameter manager to  
3   provide one or more of said value sets from said current parameters  
4   location to an external command source.

1   5.   The system of claim 2 wherein said set of parameter commands  
2   includes a SetState command which causes said parameter manager to  
3   set one or more of said value sets in said current parameters location  
4   based on information received from an external command source.

1   6.   The system of claim 2 wherein said set of parameter commands  
2   includes a GetDefault command which causes said parameter manager  
3   to provide one or more of said value sets from said user defaults  
4   location to a processor within said electronic device.

1   7.   The system of claim 2 wherein said set of parameter commands  
2   includes a SetDefault command which causes said parameter manager to  
3   set one or more of said value sets in said user defaults location based on  
4   information selectively obtained from one of a processor within said  
5   electronic device, an external command source, said current parameters  
6   location and said factory defaults location.

1   8.   The system of claim 2 wherein said set of parameter commands  
2   includes a RestoreDefault command which causes said parameter  
3   manager to restore one or more of said value sets in said current  
4   parameters location to information selected from said user defaults  
5   location.

1   9.   The system of claim 2 wherein said set of parameter commands  
2   are originated by an external command source and wherein said  
3   parameter manager device responsively accesses parameter  
4   information in a resource file to control said parameters.

1   10.   The system of claim 1 wherein said parameter manager acts on all  
2   of said parameters in one of said series of parameter locations if a  
3   corresponding one of said set of parameter commands does not specify  
4   a particular one of said parameters.

1 11. A method for controlling parameters in an electronic device,  
2 comprising the steps of:  
3       storing value sets corresponding to said parameters into a series  
4           of parameter storage locations;  
5       providing a set of parameter commands for controlling said value  
6           sets within said series of parameter storage locations; and  
7       executing said set of parameter commands using a parameter  
8           manager device to control said value sets corresponding to  
9           said parameters.

1 12. The method of claim 11 wherein said series of parameter storage  
2 locations include:  
3       a current parameters location containing value sets corresponding  
4           to current parameters within said electronic device;  
5       a user defaults location containing value sets corresponding to  
6           user defaults within said electronic device; and  
7       a factory defaults location containing value sets corresponding to  
8           factory defaults within said electronic device.

1   13. The method of claim 12 wherein said current parameters location  
2   is in a random-access memory, said user defaults location is in an  
3   electrically-erasable programmable read-only memory, and said factory  
4   defaults location is in a non-volatile memory.

1   14. The method of claim 12 wherein said set of parameter commands  
2   includes a GetState command which causes said parameter manager to  
3   provide one or more of said value sets from said current parameters  
4   location to a processor within said electronic device.

1   15. The method of claim 12 wherein said set of parameter commands  
2   includes a SetState command which causes said parameter manager to  
3   set one or more of said value sets in said current parameters location  
4   based on information received from a processor within said electronic  
5   device.

1   16. The method of claim 12 wherein said set of parameter commands  
2   includes a GetDefault command which causes said parameter manager  
3   to provide one or more of said value sets from said factory defaults  
4   location to an external command source.

1 17. The method of claim 12 wherein said set of parameter commands  
2 includes a SetDefault command which causes said parameter manager to  
3 set one or more of said value sets in said user defaults location based on  
4 information selectively obtained from one of a processor within said  
5 electronic device, an external command source, said current parameters  
6 location and said factory defaults location.

1 18. The method of claim 12 wherein said set of parameter commands  
2 includes a RestoreDefault command which causes said parameter  
3 manager to restore one or more of said value sets in said current  
4 parameters location to information selected from said factory defaults  
5 location.

1    19. A computer-readable medium comprising program instructions  
2    for controlling parameters in an electronic device by performing the  
3    steps of:

4                storing value sets corresponding to said parameters into a series  
5                of parameter storage locations;  
6                providing a set of parameter commands for controlling said value  
7                sets within said series of parameter storage locations; and  
8                executing said set of parameter commands using a parameter  
9                manager device to control said value sets corresponding to  
10               said parameters.

1    20. The computer-readable medium of claim 19 wherein said medium  
2    is a memory device which is removable from said electronic device for  
3    reprogramming, and which contains scripts that execute said set of  
4    parameter commands to cause said parameter manager to control said  
5    value sets corresponding to said parameters.

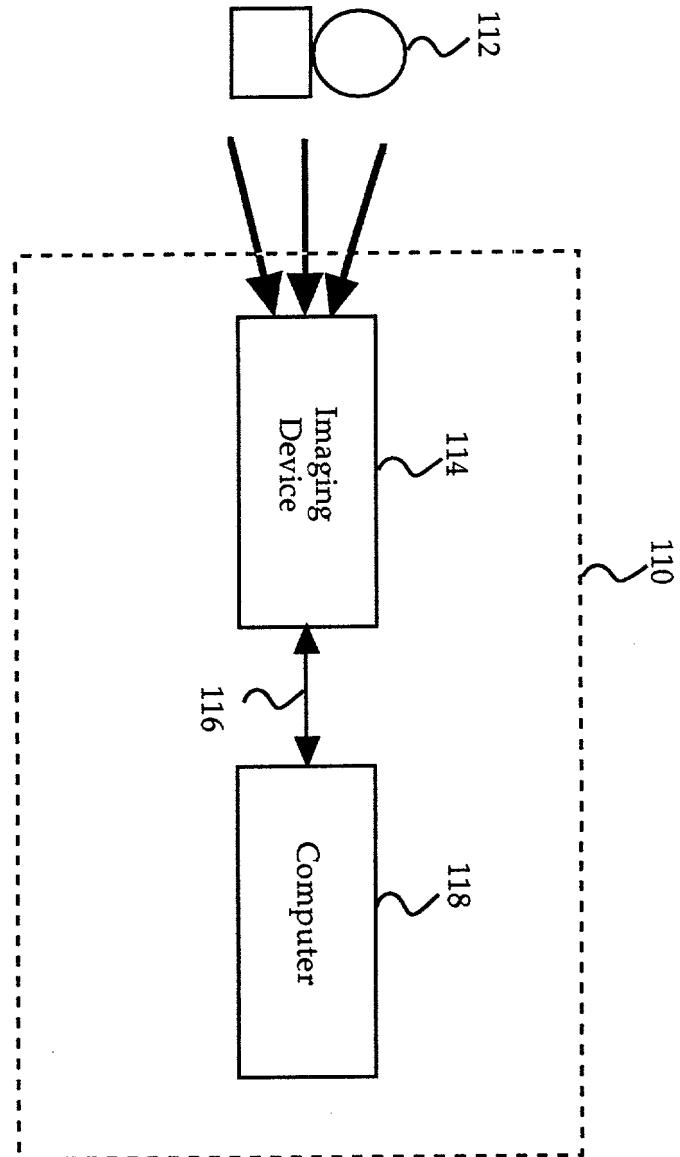
1    21. A system for controlling parameters in an electronic device,  
2    comprising:  
3        means for storing value sets corresponding to said parameters  
4                  into a series of parameter storage locations;  
5        means for providing a set of parameter commands for controlling  
6                  said value sets within said series of parameter storage  
7                  locations; and  
8        means for executing said set of parameter commands using a  
9                  parameter manager device to control said value sets  
10                 corresponding to said parameters.

**SYSTEM AND METHOD FOR CONTROLLING PARAMETERS  
IN AN ELECTRONIC IMAGING DEVICE**

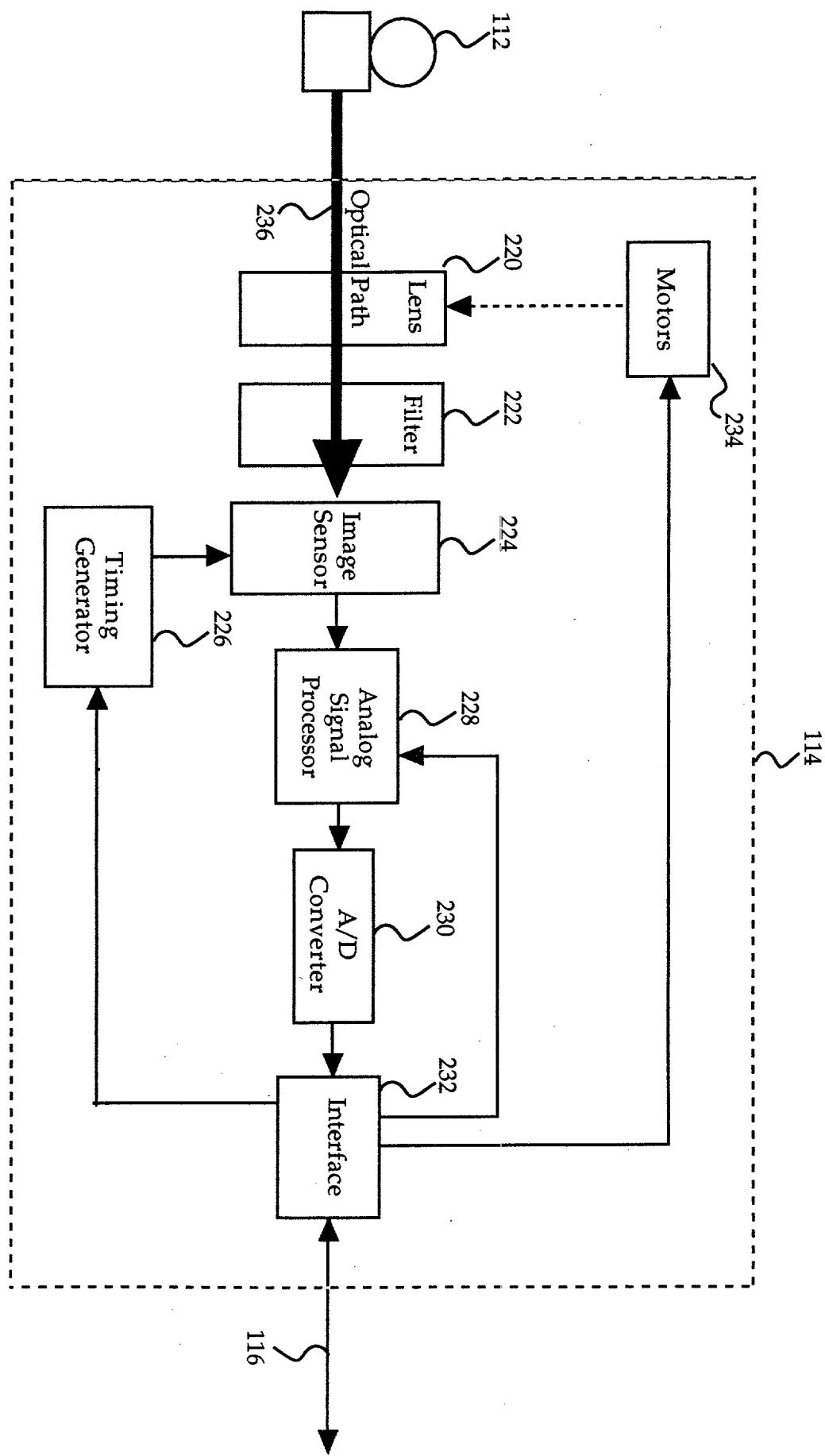
**ABSTRACT OF THE DISCLOSURE**

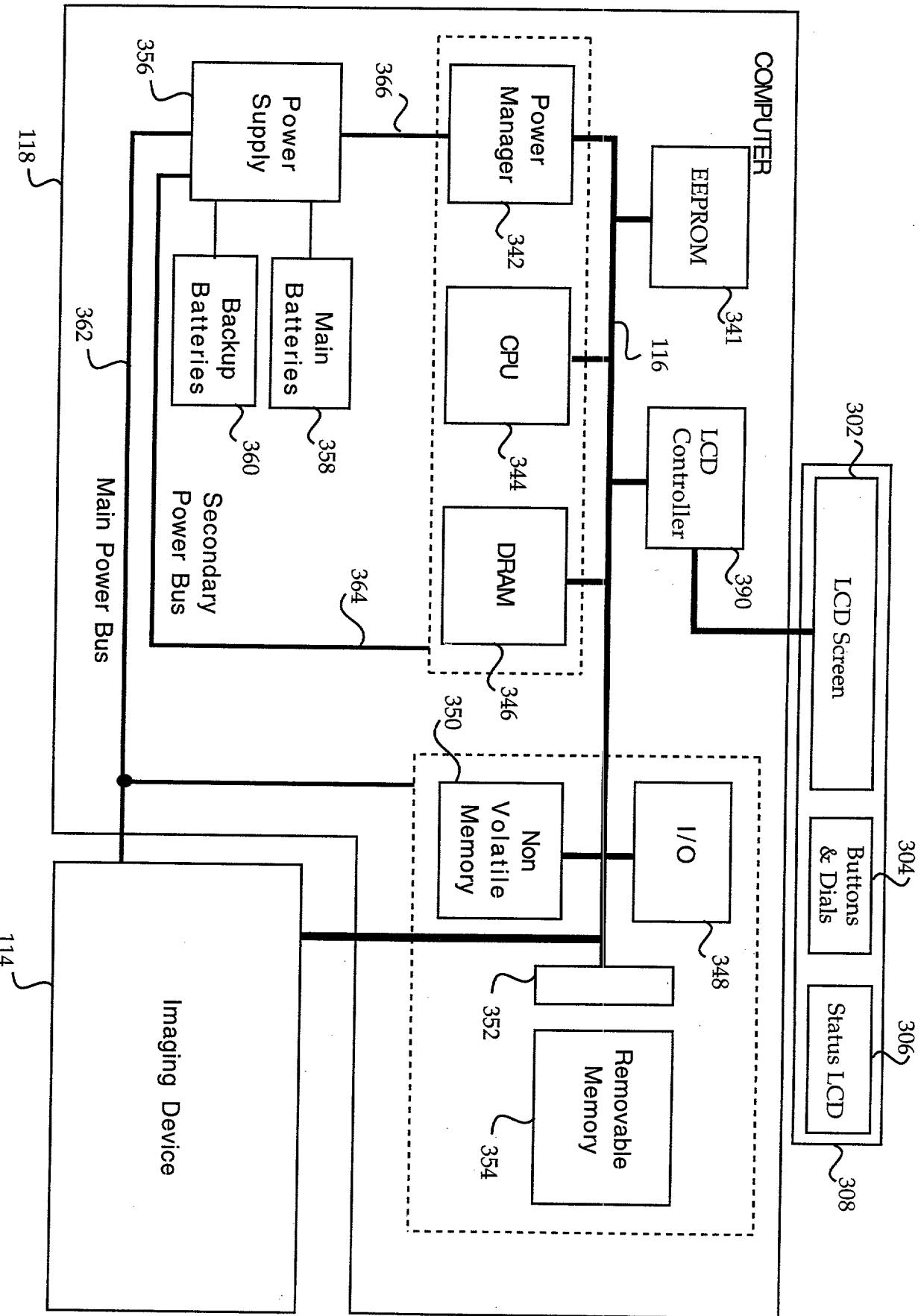
A system and method for controlling parameters in an electronic imaging device comprises a series of parameter storage locations coupled to the imaging device for containing parameter value sets, a set of parameter commands for controlling the parameter value sets, and a parameter manager device for executing the set of parameter commands to control the parameters in the electronic imaging device.

**Fig. 1**



**Fig. 2**

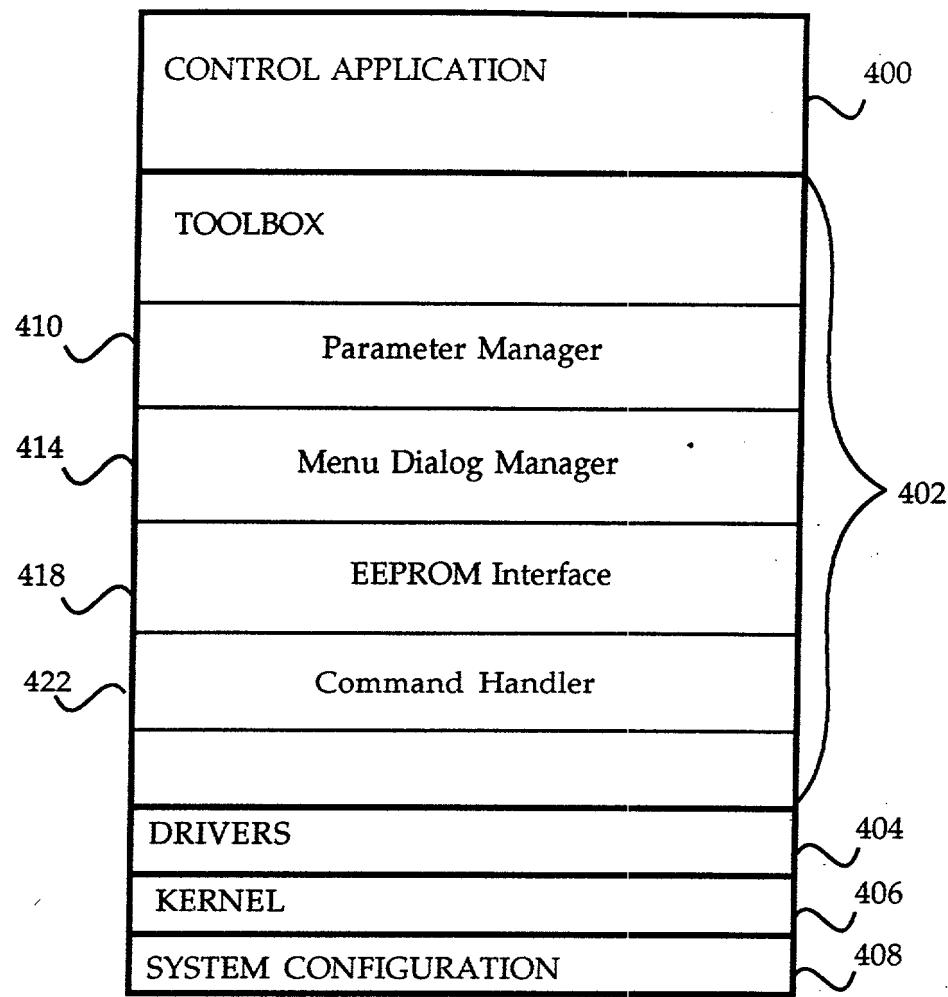




**FIG. 3**

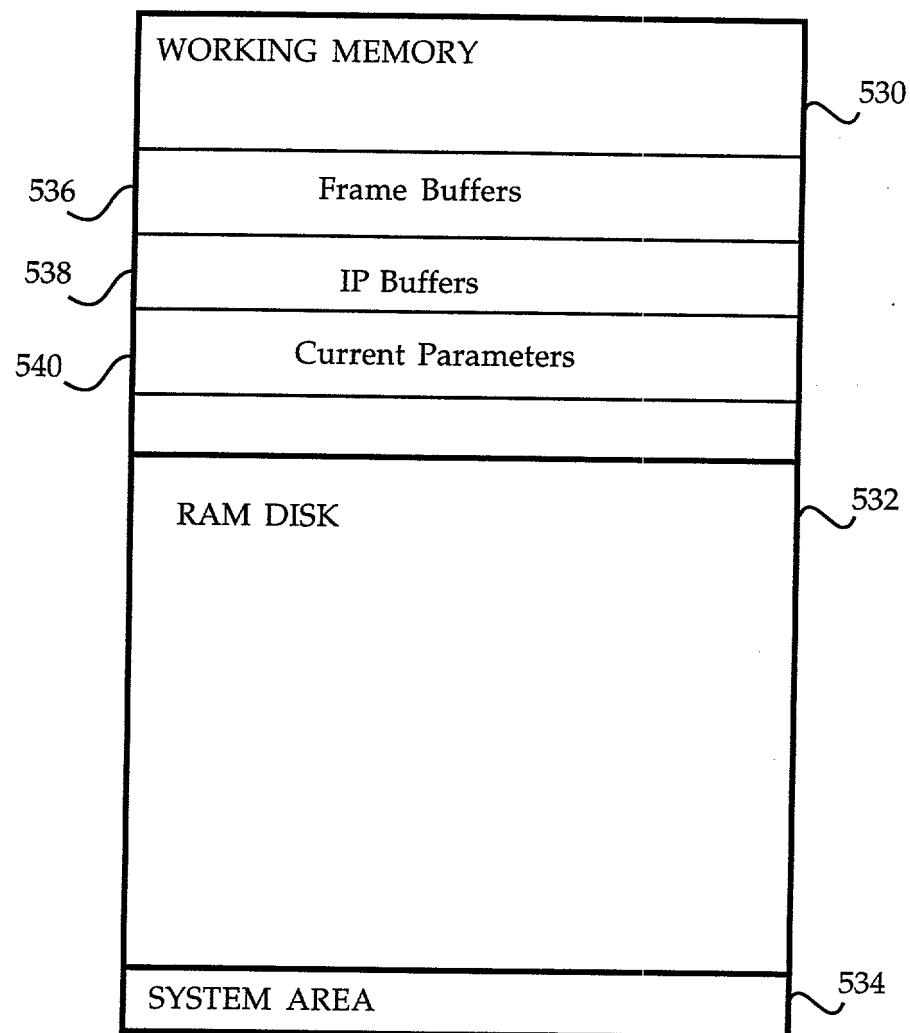
118

114



350 →

FIG. 4



346

Fig. 5

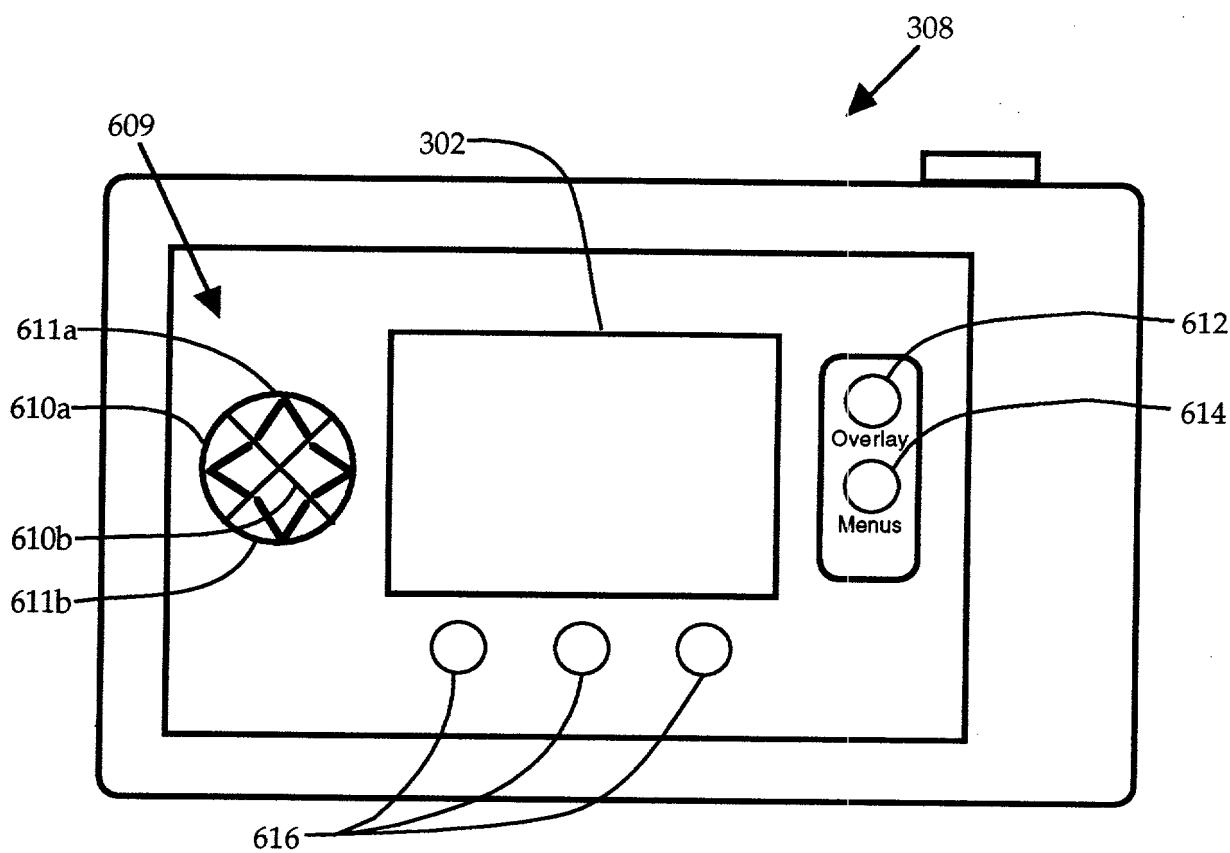


FIG. 6A

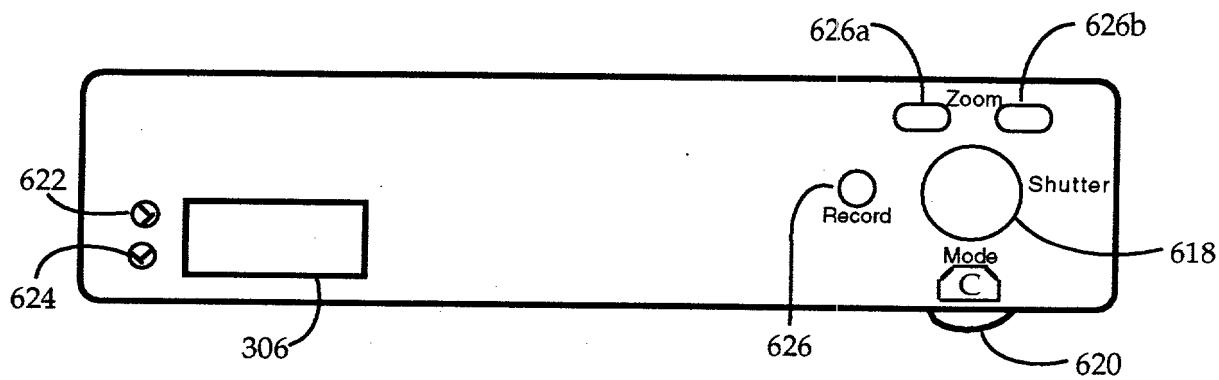
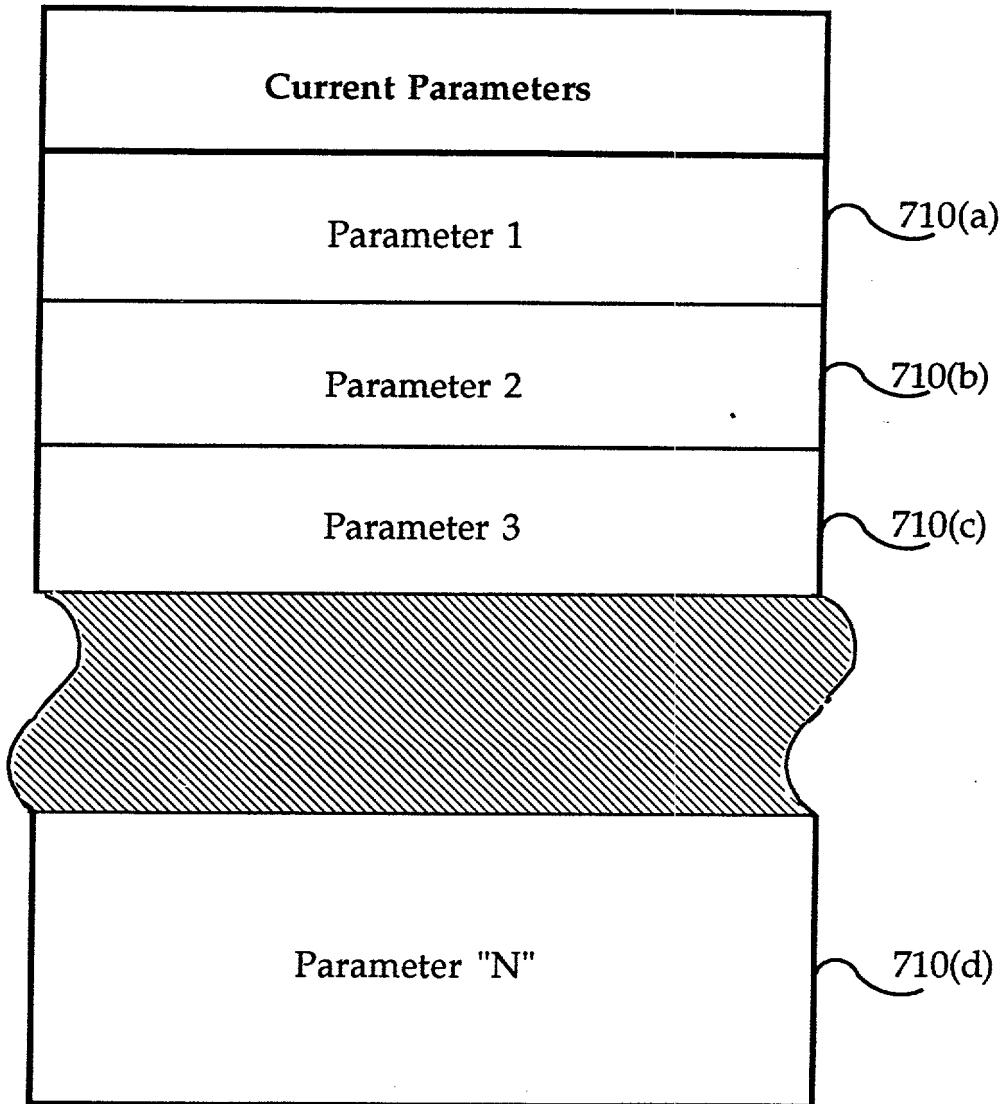


FIG. 6B



540

Fig. 7

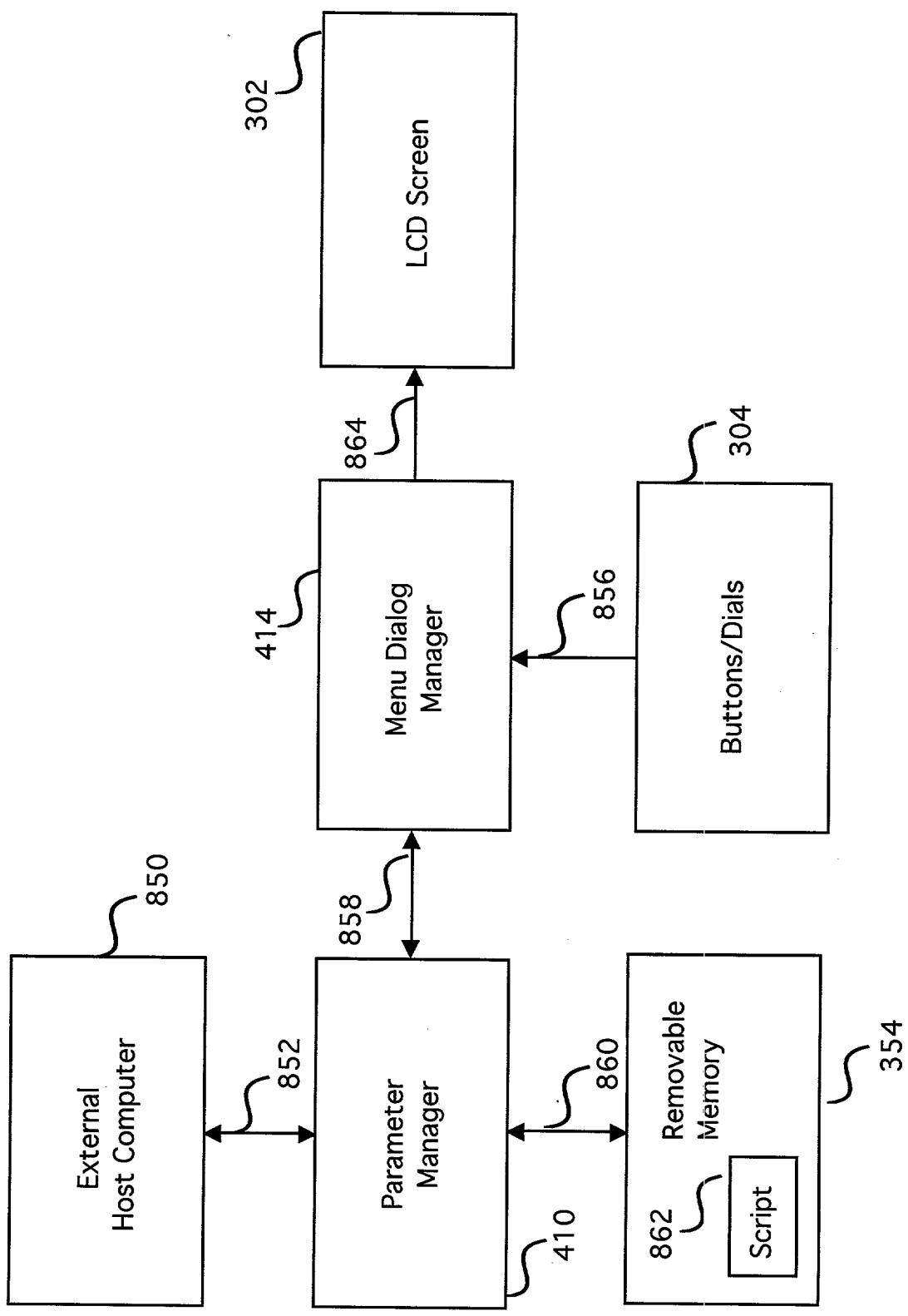


Fig. 8A

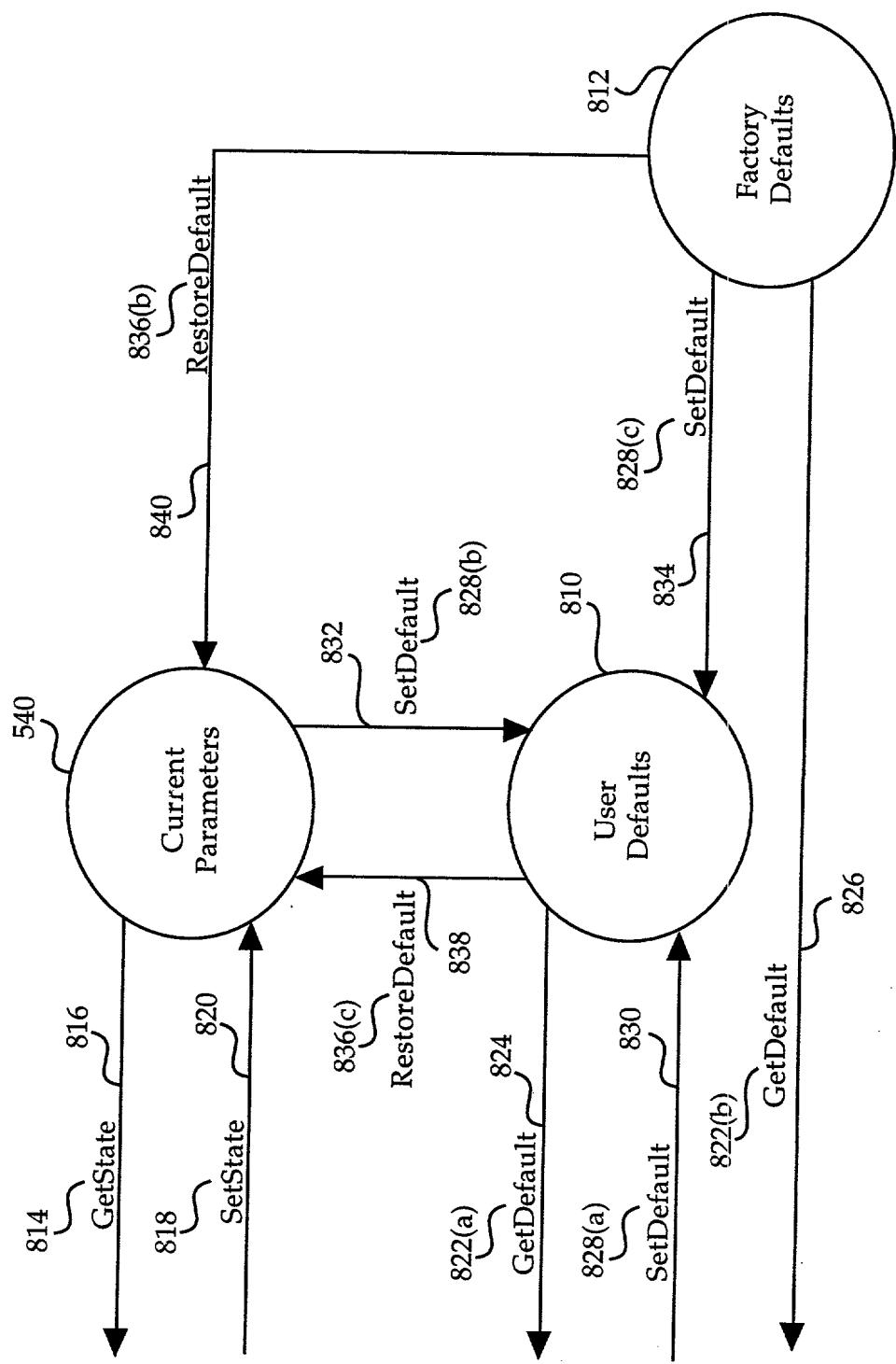


Fig. 8B

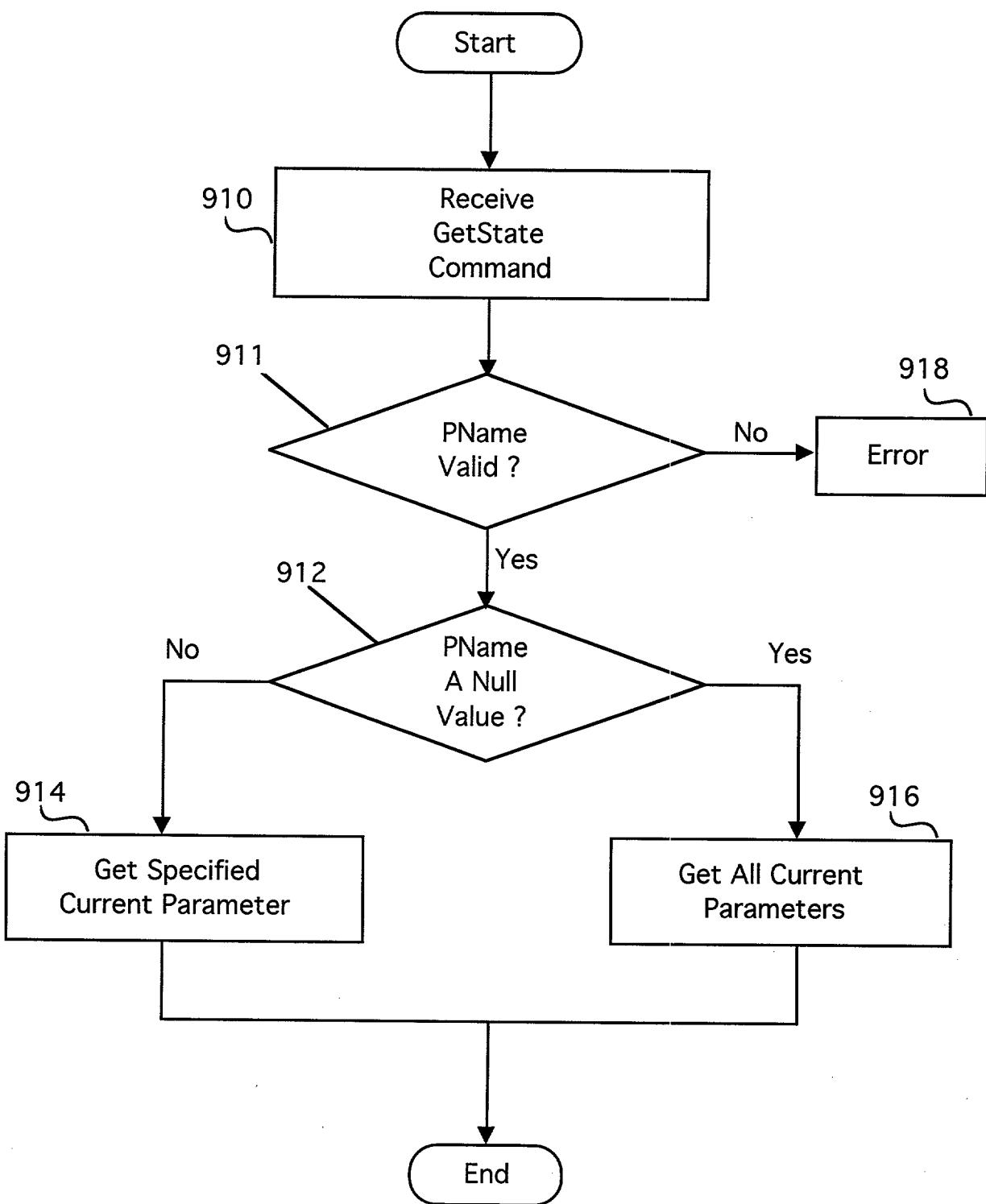


FIG. 9

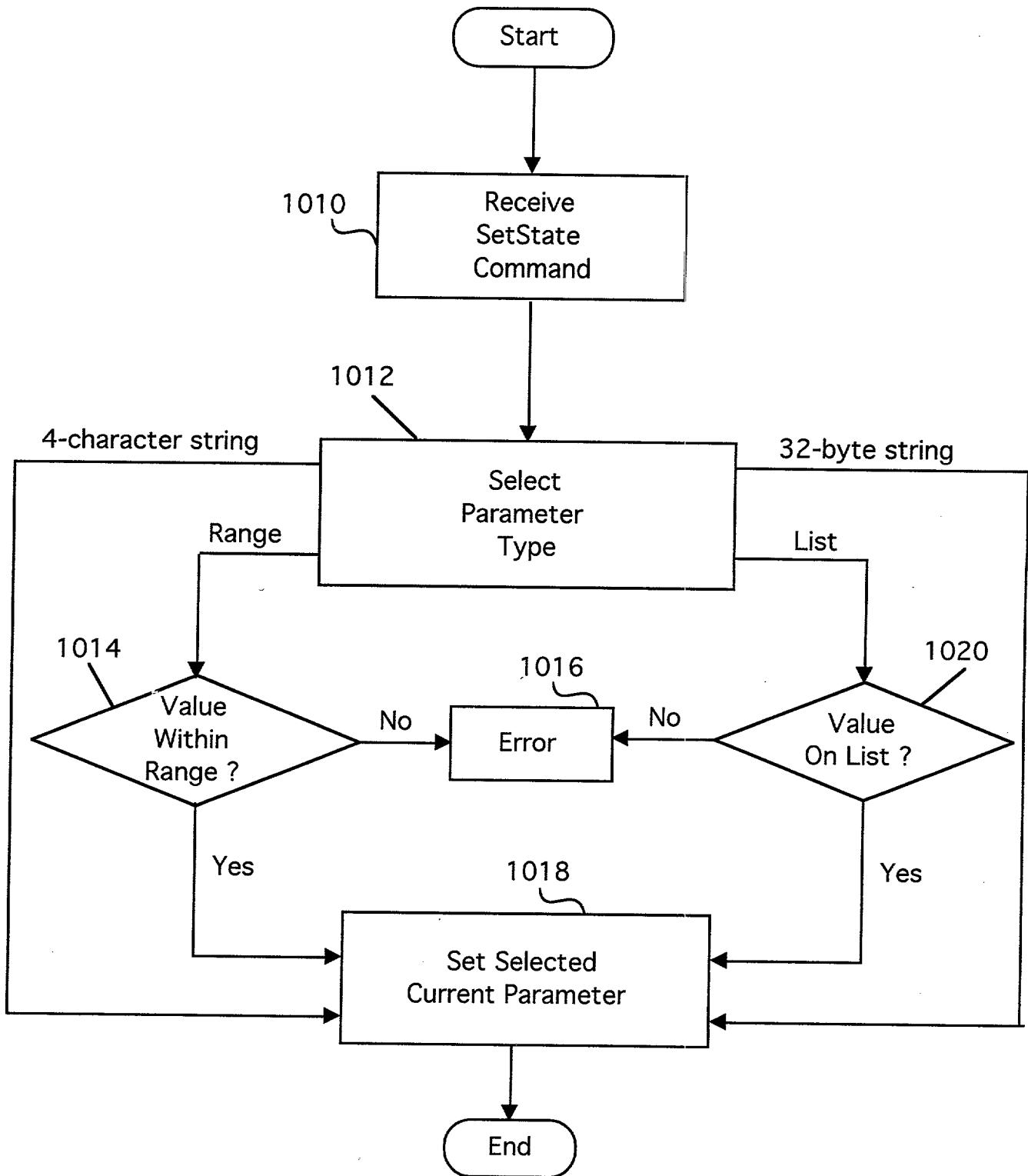


FIG. 10

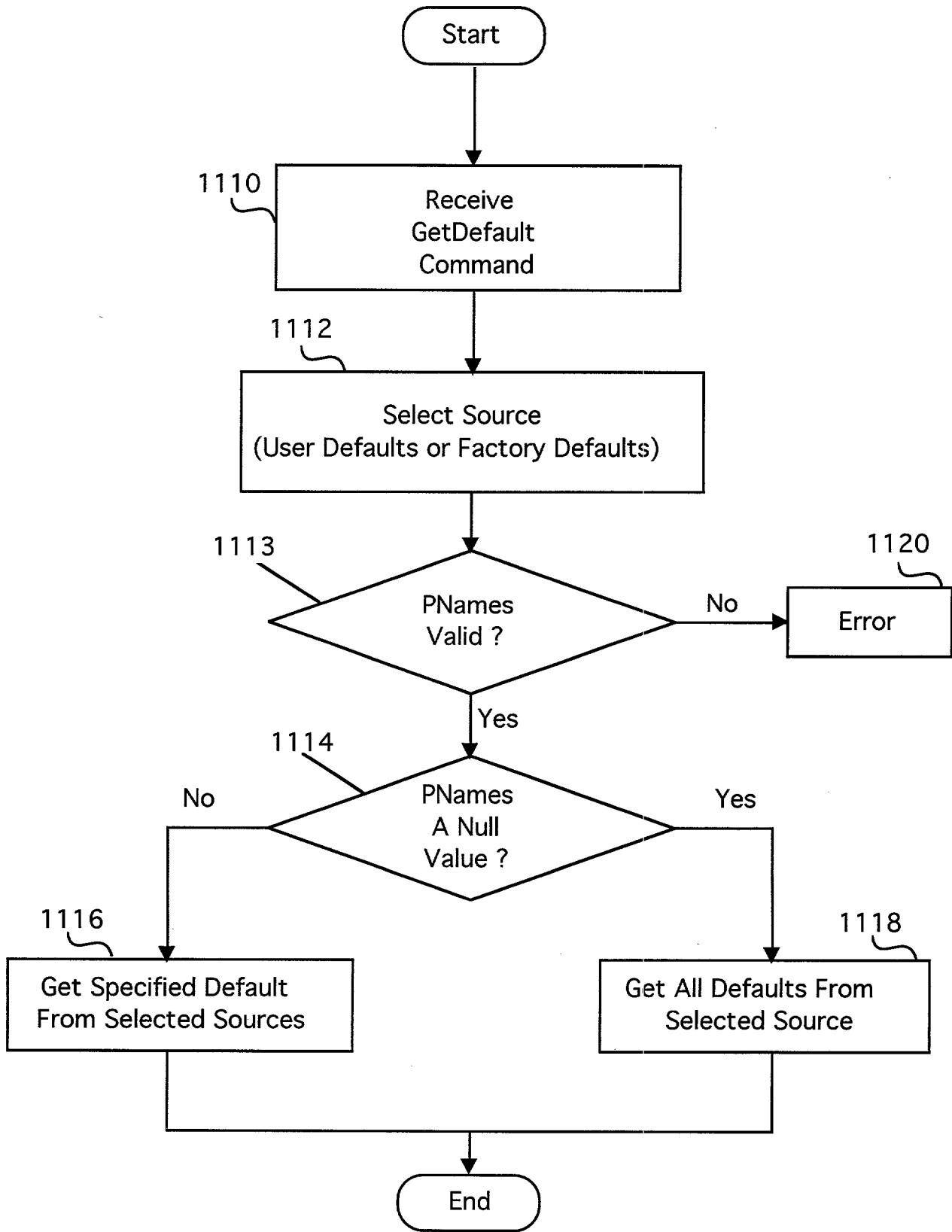


FIG. 11

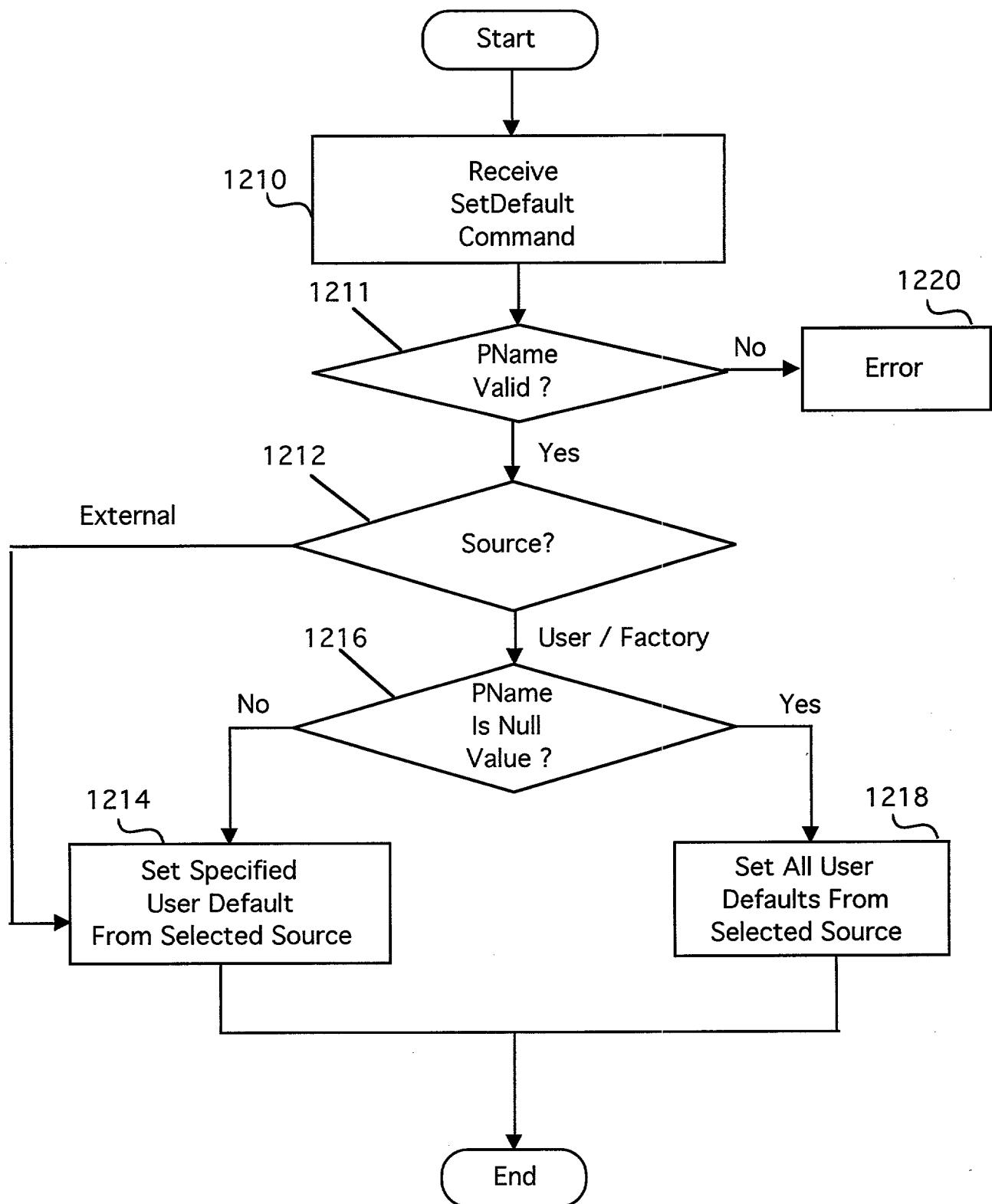


FIG. 12

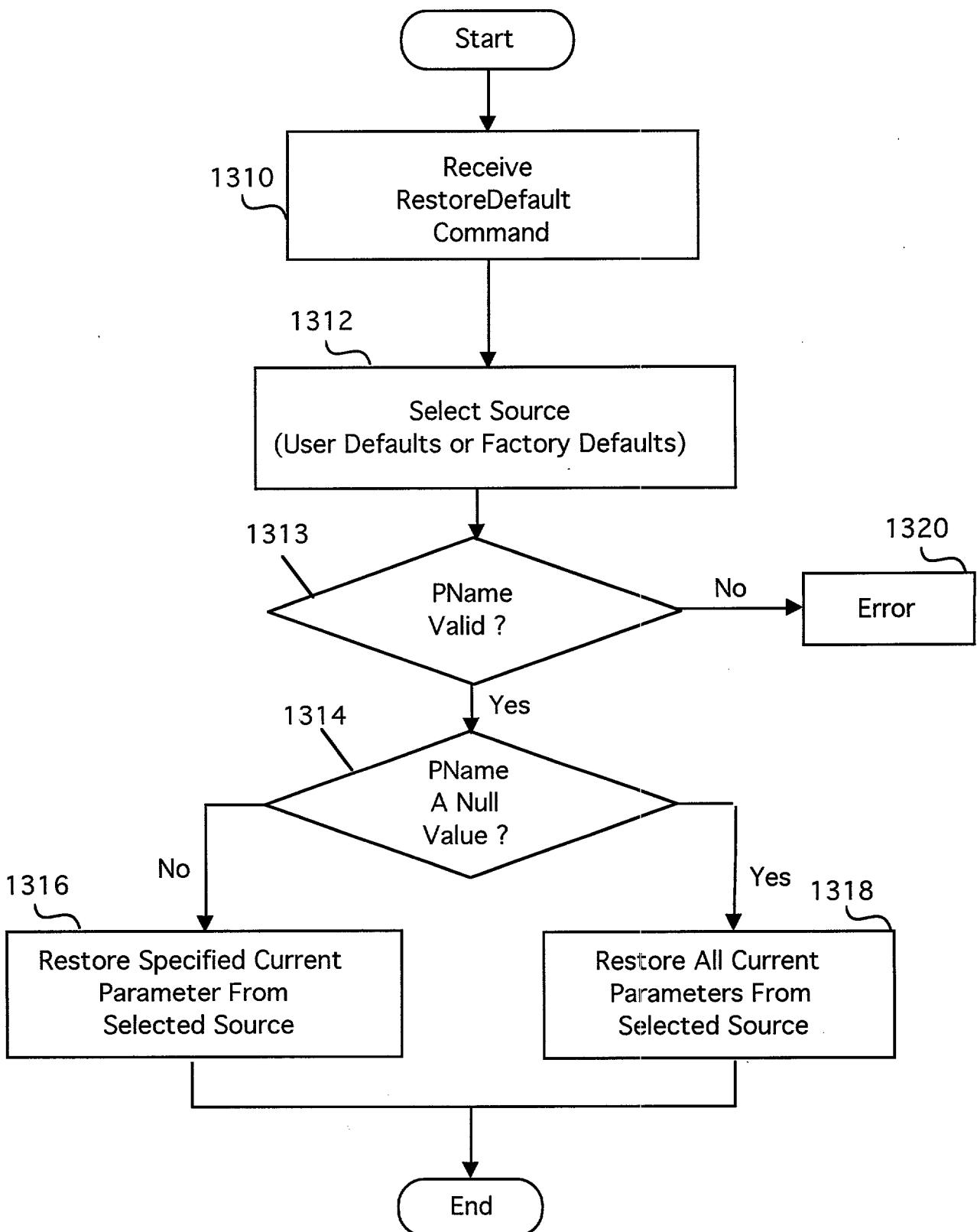


FIG. 13